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GEOGRAPHIC CONTROL OF TRANSPORTATION IN THE SOUTHEAST

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THE area here included in the term Southeast extends from the Appalachian Mountains to the Atlantic Ocean and from the Potomac River to the Floridan Province whose boundary is approximately a line from Montgomery, Ala., to Savannah, Ga. This term is sometimes used to include the Eastern Gulf States. This area has a maximum width of nearly 300 miles and is about 700 miles in length. It is the principal avenue of land transportation between the large area in the warm temperate and sub-tropical climates of the Southern Coastal Plains producing enormous quantities of raw materials, and the excellent harbors and great centers of manufacture and distribution on Chesapeake waters and northward. It has become this thoroughfare largely because it is directly in line between these factors of production and distribution, but this location has been partially determined by the influence of the Southern Coastal Plains producing enormous quantities of raw materials of the great mountain barrier on its western border.

PHYSIOGRAPHY

As a whole this mountain region is a belt of ridges bounding the Great Valley. East of this barrier there are two large and distinct physiographic provinces each long and narrow and in general parallel to the mountains and to the coast.

The Piedmont Plateau or "Upper Country", a maturely dissected peneplain, has an elevation of 1200 feet or more where it meets the mountains on the west and slopes somewhat uniformly to its eastern margin where the altitude varies from 300 to 500 feet. Underlying this belt is the Basement Complex consisting chiefly of igneous and metamorphic rocks. A larger proportion of rough topography along the eastern margin of this plateau than elsewhere in it, with the elevation of this margin above the Coastal Plain, helps to make it a distinct province of transportation. The width of the Piedmont at the south, nearly 150 miles, and its elevation there, 1000 feet or more, decrease with varying uniformity northward to the Potomac where it is a narrow strip at tidewater.

Stretching eastward to the ocean from an elevation of 200 to 400 feet along the margin of the Piedmont lies the Atlantic Coastal Plain. The rocks of this plain are of sedimentary origin and the "Fall Line" is formed by the

meeting of these physiographic provinces. In North Carolina, however, the rocks of the Basement Complex outcrop in the streams and valleys twenty to forty miles east of this line and Raleigh is thirty miles west of the rapids. The Coastal Plain is naturally divided into three parts.*

The western one is in part an area of Triassic sandstone and shale. This is the fall line region and is known as the Pine Barren, also as the "Sandhill Section."† It is thirty to forty miles wide and varies from 200 to 400 feet in elevation.

The Upper Pine Belt is the middle subdivision of the Coastal Plain and is 100 to 300 feet in elevation.‡ Its topography is much like that of the Pine Barren but is less rugged.

The eastern part of the Coastal Plain is low and very level, much of it being less than thirty feet above the sea and it rarely exceeds sixty except toward its western border where it grades insensibly into the Upper Pine Belt at an elevation of nearly 100 feet. This is the Lower Pine Belt.**

The relief of these provinces varies directly as the elevation. The swamps and pocosons of the Lower Pine Belt are due to insufficient relief for drainage. As the distance increases westward across these belts, the elevation increases, the surface becomes more rugged, and the topography advances through the stages of youth to those of maturity in a region of slight relief and to a typical mature region of greater relief in the Piedmont; here the new base level is being cut by lateral planation, in numerous places 200 feet below the remaining surface of the upland peneplain (See Columbia and Gaffney, S. C., and Charlotte, N. C., quadrangles, U. S. Geological Survey).

The Mountain Region comprises the highest land in the United States east of the Mississippi River with Mt. Mitchell (6711 ft.) as the culminating point, and numerous others a mile or more above sea level. The mountain passes—water gaps and wind gaps—are 500 to 1500 feet higher in North Carolina than those used by the railways in Virginia and northward.

Transportation Lines

Each of these natural provinces is the location of a system of north-south transportation. The Southern Railway traverses the Piedmont Belt. Its shorter branches are in the Piedmont but some of the longer ones extend into the Great Valley and westward. On the Coastal Plain it reaches Norfolk and Savannah and extends southward into Florida.

The Seaboard Air Line is the fall line road and the line direct to the State capitals. It extends southward from Petersburg, Va., and parallels the Piedmont road about 60 to 70 miles east of it in the Pine Barrens. Its

*Emerson, F. V., *Geographical Influences in American Slavery*, Bul. Am. Geog. Soc., Feb., 1911.

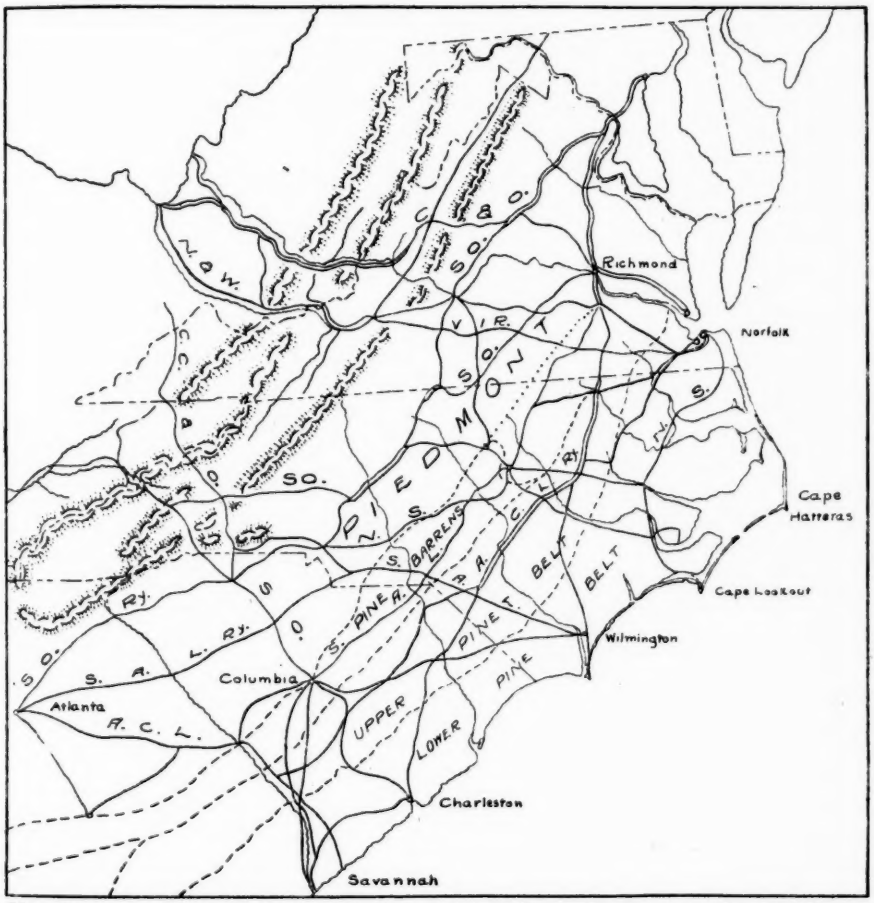
†Glenn, L. C., *Geography of South Carolina*, Supplement in Natural School Geography, Redway and Hinman.

‡See the following topographic sheets, U. S. G. S.: Rocky Mount, Kenly, Four Oaks.

**See Newbern, Chocowinity, and Beckford quadrangles, U. S. G. S.

shorter branches are in a region of topography like that of the main line but it reaches Atlanta and Birmingham via a line from Wilmington, N. C., part of which is on the Coastal Plain and part in the Piedmont. From Columbia, S. C., the main line extends into Florida on the Coastal Plain.

Traversing the Upper Pine Belt, the Atlantic Coast Line Railway parallels the fall line road about twenty miles east of it.



Map Showing Topographical Adjustment of Railway Systems in the Southeast.

The rapid agricultural and industrial development in the Southeast has given rise to a relatively new road—the Norfolk Southern Railway. This line extends from Norfolk to Beaufort, N. C., on the Lower Coastal Plain.

In the Great Valley there are a few lines of minor importance whose chief service is to transport coal to the larger roads. The Carolina, Clinchfield, and Ohio is one of these. It is now building to Charleston, S. C. The Virginian Railway is a coal road to Norfolk. In Virginia where the Piedmont is narrow and the Great Valley broad and fertile, the Norfolk and Western operates a line along the latter to northern connections.

East-west Lines

In each of the states of this area there are cross roads to the principal harbors that are not reached by the main lines and each north-south system enters two or more of these ports. On these harbors are Savannah, Charleston, Wilmington, Richmond, Norfolk and Newport News. Wilmington, N. C., recently became distinguished by shipping to England the largest cargo of cotton that ever left an American port. It consisted of 20,324 bales valued at $1,525,000. Wilmington is reached by five lines owned by two of the north-south systems. Attention is now being directed toward Cape Lookout where the Government is preparing to construct an enormous breakwater to improve the natural harbor with its depth of forty feet. The Norfolk Southern is now building to this point and will transport coal received from connecting lines at Charlotte to the new deep-water harbor. The Norfolk and Western has a right of way and will build an extension from Durham, N. C., to Cape Lookout. It will bring coal for the Panama trade via Lynchburg, Va., to a deep water harbor at a point safely south of Cape Hatteras and its many dangers to navigation.

Clustered about the harbor at Hampton Roads are half a dozen cities whose existence depends primarily on the receipt and transfer of commodities both foreign and domestic. Among these are Hampton, Newport News, Portsmouth, and Norfolk. Their total population equals that of Richmond, located on tidewater but eighty miles inland. The Government maintains a deep water channel to the Navy Yard at Portsmouth. "All roads lead to Norfolk."

The efficiency of the mountains on the west as barriers is shown by the fact that it is three to five hours shorter from most points in North Carolina to Kansas City, Mo., via Atlanta and the Frisco's Jacksonville Flyer through Birmingham, Memphis, and Springfield, Mo., than by any route across the mountains via Louisville and St. Louis. A train in operation to Memphis via Asheville, N. C., was recently discontinued because of the easier and quicker route through the Gulf States.*

In Virginia and northward the economic necessity for east-west transportation is sufficiently great to justify the expense of constructing important trunk lines across the Appalachian barrier, and numerous roads follow the lines of least resistance along picturesque streams and through tunnels or via water gaps and wind gaps from the fertile valley of the Ohio to the level of the sea. Among these are the Chesapeake and Ohio Railway, and the Norfolk and Western.

Topographic Control

"Geological structure, and resulting geographic conditions, have determined the direction of our system of internal improvements, from the days

*Prof. Collier Cobb, "Geographic Factors in the Making of Atlanta," an address before the A. A. A. S., reported in the Atlanta Constitution, Jan. 1, 1914.

of waterways and plank roads down to the present. The united will of the people has been unable to give us a State system of railroads. Our old North Carolina Railroad from the mountains to the sea has been turned aside by the strike of the rocks, the geological structure of the country, to build up other states and other ports than ours.**

The early roads built in the Carolinas to meet local requirements have been absorbed by the north-south systems. Those located chiefly on the Coastal Plain became the property of the larger lines traversing the provinces of the Coastal Plain, and the roads lying chiefly in the Piedmont were taken over by the Piedmont Line. In some instances those parts of the old roads built in the Piedmont were bought by the Southern Railway and those parts built on the Coastal Plain were absorbed by the trunk lines that traverse the lower provinces.

OPERATING COST PER MILE OF ROAD*

Road		Maintenance of way and structures	Maintenance of equipment	Traffic expenses	Transportation expenses	General expenses	Total
Piedmont Belt, Southern Ry.....	July, '12 to Mch., 1913, inclusive	$975	$1210	$219	$2513	$213	$5130
Fall Line, Seaboard A. L. Ry.....		790	822	186	2156	168	4122
Upper Coastal Plain, A. C. L.....		781	891	103	2059	150	3984
Lower Coastal Plain, N.-S.		547	588	78	1398	245	2856
	1912						
Piedmont Line, Southern Ry.	Dec.	108	134	24	293	26	585
	July	103	136	23	265	22	549
Fall Line Road, S. A. L. Ry.	Dec.	93	94	21	251	20	479
	July	90	83	21	210	17	421
Upper Coastal Plain Line	Dec.	85	97	12	241	17	452
	July	83	104	9	211	16	423
Lower Coastal Plain Line	Dec.	62	64	8	160	28	322
	July	59	61	10	164	25	319

The influence of topography on the cost of operating these railways is shown in the above table, the upper half of which gives the aggregate expense per mile from July, 1912 to March, 1913 inclusive, and the remaining part shows seasonal differences per mile.

**Prof. Collier Cobb, "Geographical Influences in the Development of North Carolina," Address, reported in The News and Observer (Raleigh), July 2, 1896.

*"Bulletin of Revenues and Expenses of Steam Roads in the United States," Interstate Commerce Commission.

A comparison of the expenses in the column of totals for each group shows that they vary directly as the elevation and consequently as the relief of the provinces traversed by the respective roads. An inspection of the figures in the other columns of cost per mile shows the same relation to topography with but two exceptions in the group of aggregates and only six among the items of monthly expense. All exceptions in the column of General Expenses are due to the shorter mileage of the Norfolk Southern line. The same general relation exists among the total costs (right of way, constructing, etc.) per mile of these roads to 1911 inclusive, which are as follows: Southern Railway (Piedmont), $57,986; Seaboard Air Line (Fall Line, Pine Barrens), $51,045; Atlantic Coast Line (Upper Pine Belt), $34,411; Norfolk Southern (Lower Pine Belt), $31,633.‡

Influence of Climate

The total expense per mile in each province as given in the table is larger in December than in July showing a seasonal difference. The expenditure per mile during July increases with the elevation and relief and the cost of operation for December is also adjusted to the topography of the respective provinces. The figures given under the individual items of expense reveal the fact that, in fifteen comparisons among these details, there are but four exceptions to this adjustment for July and only two for December. The differences between the total expense for December and July for the four physiographic provinces in their order from the sea, are $3, $29, $58, and $36. In this we see the seasonal variation of a littoral climate contrasted with that of a plateau climate with some degree of gradation between the two.

The effect of climate on the expense per mile as the season advances is well illustrated by the following monthly totals for the Seaboard Air Line Railway in 1912: Aug. $415; Sept., $422; Oct., $456; Nov., $471; Dec., $479.* The corresponding data for the other lines in this area show a similar adjustment to seasonal change.

Summary and Conclusions

The railway systems of the Southeast are in topographic adjustment, each physiographic province being traversed by one system. The expenditures of the respective roads vary directly as the elevation and relief of the provinces traversed.

The Southern Railway is a plateau line, chiefly in the Piedmont. It has branches in the Cumberland Plateau and some in the adjacent mountain region which tends to increase the expenses per mile.

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*Data from bulletins of Interstate Commerce Commission.
‡Data from report of North Carolina Corporation Commission for 1911.

The Atlantic Coast Line Railway has a larger proportion of its mileage in the Lower Pine Belt than has the Seaboard Air Line Railway. This tends to reduce the expenditures of the Coast Line slightly more than those of the Seaboard.

The same factors that cause the railroads to parallel the mountains in the Southeast, force railway systems to cross the Appalachian barrier in Virginia and northward.

New roads are building or preparing to build to every deep water harbor south of Cape Hatteras to supply coal for the Panama trade.

The expenditures of a railway system conform to the season of the year. The difference between the influence of an equable climate and that of an upland continental one, with intermediate gradations, is expressed by monetary values in the expenditures of steam roads among the natural physiographic provinces of the Southeast.

Teachers of Geography

THE teacher of geography in American normal schools is expected to be a versatile person. According to information compiled by the United States Bureau of Education, the teacher of this subject generally has it assigned to him as one of a number of different subjects. In only 26 out of 233 public normal schools is there a teacher who teaches geography and nothing else.

In two public normal schools the geography teacher handles ten other subjects. Eight other subjects besides geography are taught by the same teacher in three normal schools, and seven in the case of four others. Many of the schools allot five and six subjects with geography to the same teacher. In private normals similar versatility is required; geography frequently occurs as one of seven or eight subjects in charge of one teacher.

Generally the subjects are more or less closely related, but sometimes they embrace several widely divergent fields. Geography and history form a frequent and natural combination, as do geography and nature study. Geography and drawing are sometimes combined. On the other hand, music is added to these combinations with the effect of broadening the requirement considerably.

There are many other groupings of subjects resorted to by the normal schools for obvious reasons of economy. In a western normal school of excellent standing one teacher has the following program: Geography, chemistry, agriculture, photography, nature study, geology, grammar, and school architecture.

THE VOCATIONAL ASPECT OF REGIONAL GEOGRAPHY*

By President W. J. Sutherland
Normal School, Platteville, Wis.

SOCIAL progress is determined largely by physical environment. Usually, backward and indolent people inhabit the less productive regions of the world. Rich areas support progressive, enterprising people. Ignorant people often remain in backward conditions because of their inability to select those pursuits which can be used most advantageously for the betterment of their conditions. Education performs a very distinct function in guiding people in their selection and best use of the elements of their environment.

Response to Environment

The "new geography" is quite fond of speaking of *controls* and *responses*. Certain it is that man cannot re-create his physical surroundings. The best he can do is to modify, in a small way, certain selected phases of his environment. He may add lime to acid soils, he may irrigate arid lands and make them productive; but even here it is plainly apparent that his physical environment is determining his *individual* activities. His labor is not from choice, but from necessity. The man who has to irrigate is handicapped in the race for prosperity.

The physiographic regions of any country furnish a most interesting study inasmuch as the physical conditions combine to give each region a personality and character that is often unique. Especially noticeable in this respect are the regions of the United States. As a result of certain combinations of physical forces, sets of conditions determine highly characteristic organic responses. Hence it is that plant and animal adaptations have become such interesting studies. Eliminate a single condition from any combination and likewise through the operation of the law of the "survival of the fittest," the whole organic response is changed.

Man can do best for himself by working in harmony with Nature. Because sets of conditions fail to satisfy, men remove from one region to another with the hope of finding combinations better suited to their needs. The fact that men emigrate suggests at once some power to analyze conditions. The same intelligence, however, guides the new settler in the selection of industries adapted to his locality.

Society is, therefore, dependent on its physical environment for its existence. Industry is the link which connects man with his environment. Social progress depends upon the wise selection of human activities as determined by the physical advantages which a region offers. Reasonable returns for a given outlay of labor and capital make better homes, added advancement, and higher social attainments. Hence there is a direct connection between

*Read at the 1913 meeting of the Central Association of Science and Mathematic Teachers, Des Moines, Iowa. Printed also in *School Science and Mathematics*, Feb. 1914.

rich soils, generous rainfall, favorable temperature, and a cultured people. And yet, this statement suggests a wise use of "talents." This is another way of saying that the industries, the vocations of the people, are of supreme importance. Social progress depends upon the two factors, a favorable physical environment and an advantageous adjustment of human effort to that environment. Since man cannot annihilate or recreate his environment, it appears that the most importat element entering into social progress is found in his industry or vocations. Hence, then, the three elements intermingle, i. e. man, industry, and environment; and, since man himself changes slowly in response to environmental conditions, it would seem, that in his industry, his vocation, lies the chief hope of progress, culture and independence. His industry he can control, his physical environment he can in a limited way modify, while he, himself, is changed only in the slow process of time in response to his vocation and environment.

The Twentieth Century renaissance in education had for its slogan "Education and Life." Abundant and complete life, however, are terms which signify social progress. The ever increasing complexity of modern life compels more delicate and carefully selected social and economic adjustments. If such adjustments are unwise or imperfectly made, individuals are doomed to economic failure. Social progress and reform bear a direct relationship to economic progress. If this philosophy be true, it is of the highest importance that our education place due emphasis upon such subjects and phases of subjects as not only to show the individual's dependence upon his physical environment, but also to permit of some direct application of his education and training in the use and appropriation of the elements of his environment.

Adjustment to Environment

The youth of the land are inclined to develop, dwell in, and enter into the industrial pursuits of the neighborhood or locality in which they were born. The physical conditions surrounding them, then, are of first importance as related to their social welfare. Tradition is often a handicap and a drawback to progress. Economic prosperity and culture are the direct outgrowth of a wise use of natural resources. And, as already pointed out, modern life with its changing economy, demands the keenest and wisest of economic and physical adjustments. The rather easy conditions that obtained in pioneer life, when soils were exceedingly rich and had only to be "tickled with a plow to bring forth abundant harvests"; when valuable minerals often outcropped or were hidden in shallow pockets; and when indigenous fruits and game were abundant, have now given place to an intense stress and strain in which only keen intelligence and a high degree of personal initiative insure success. The social phase of life is greatly intensified through

the interdependence of the constantly increasing number of social groups. It matters not what one's vocation in life may be, it is still true that his sustenance can be traced back ultimately to Mother Earth. The intricacy of modern social life becomes clearly apparent when one traces the necessities and luxuries of life back through a score of social groups and economic organizations to the original resourcefulness of the earth. Education becomes dynamic only when it impresses upon the student and future citizen his relationship to the social and physical worlds in which he dwells, and gives him some instruction concerning the activities through which he may hope to maintain himself in his struggle for existence. In short, popular education must give the student a general intellectual study and glimpse of the philosophy of modern life; then in addition to this, it must teach him how to get hold of some particular phase of the world's work, which, interpreted, means that his training must, in the light of Twentieth Century life, teach him to do something.

Study of the Home Region

Rational Geography is important because the progress of human industry already made, determines an environment in which social conditions have developed. The spirit and atmosphere of the community react, in turn, upon the developing individual. He is mentally stimulated by the stress and strain, the hum and confusion of the characteristic industries of his region. It might seem that such contact with local environment might informally train the individual to meet successfully future obligations. Quite the opposite is true, however! "Familiarity breeds contempt," and the consciousness of the student is dulled by frequent contact with existing conditions. Tradition, too, tends to guide his thinking in the currents of old channels. Nothing is more pertinent and true than the fact that progress means a breaking away from old traditions and activities whenever keen insight has discovered, and practical experience verified, the advantages of a *new* way. "New occasions teach new duties." Even though there are individual pursuits as old as creation itself, even before the sun sets scientific progress and industrial development may show the world a new method through which original resources and raw materials can be prepared and brought with greater economy to the consumer. Hence it is that the geography of one's own region is, generally speaking, of first importance. It is true, also, that the rising generation will never attain success through informal education picked up from ancestors and neighbors. The vocational aspect of regional geography places due emphasis upon the study of industries, and since prosperity and culture are so directly dependent upon industry, it would seem that great importance attaches to this phase of geographical study.

The Study of Industries

To consider the vocational aspect of regional geography is to place emphasis upon the industries of the regions, for vocation or industry is the link which ties man to his environment. Sometimes the individual comes in *direct* contact with the resources of his environment, as in the case of the tiller of the soil. In this instance the industry called agriculture is the binding link. Again, the individual may come in contact with the resources of his environment in an *indirect* or *remote* way as, for example, when his activities are concerned not with his physical environment directly, but with some product of the earth brought to him by other social groups. Usually, however, in the study of geographic regions, men come in direct contact with natural resources. The production of rice, cotton, and sugar in the Gulf Plains; of wheat in the Red River Valley, of fruit in the Lake Plains, and of corn in the Prairie Plains, are hackneyed examples of this truth. The hope of the future in any of these regions resides in improved methods of production as yet undiscovered.

The new geography has for its chief characteristic the idea of relationship. The rational idea becomes most prominent when we consider the vocational side of regional geography. Life responses together with inorganic resources always determine the industries of a region. Hence industry is a secondary response to physical environment. If we choose to go a step farther it may be said that the temperament, impulses, culture and ideals of the people are social responses to a larger environment made up of physical, industrial, and economic elements. The value of geographical study never appears in its fullness until pupils have caught something of this philosophy. Indeed, the rational or logical phase of earth science appears only when such sequences are recognized. The Red River Valley of the North becomes a highly suggestive idea to the pupil who can go back in his thinking to old Lake Agassiz; who has some notion of how the recession of the great glacier slowly drained this lake over whose bed those deposits of fine silts had been made; and how, in the present age, immense crops of wheat, barley, and oats are produced in this rich soil. And yet again, the student who is taught to think well, may safely conclude that in such a region there will dwell on improved farms and in good homes, a progressive, intelligent, and reasonably cultured rural population. The Red River Valley, then, is synonymous with prosperity and enterprise. Students who have thus carefully developed this and similar subjects in general geography, must have made valuable acquisitions. If, however, we think of the students who live in a particular region, the vocational aspect of geography becomes still more apparent. In this case the students of the advanced grades should give special attention to the individual activities of their own particular region.

In the same way, corn, oats, and stock-raising become synonymous with the expression "The Prairie Plains". To still further support the foregoing arguments, it may be said that twenty years ago in the heart of the Corn Belt, it had not been discovered that deep cultivation, when the corn was large, was a positive injury to the crop. Although corn had been the chief crop for years, the farmers themselves were astonishingly slow in realizing that the long, spreading roots of the young plants were cut and torn by deep cultivation.

Not until the last decade has there been a scientific study of seeds. What more valuable study for a pupil who lives in the corn belt and who himself expects to become a farmer, than to make a careful and rather elaborate study of the production of corn? This would include something of the geological history explaining the formation of the soils, the climatic conditions most suitable to the growth of this cereal, a general knowledge of the plant itself, something of corn judging and the selection of seed, the best time and methods of preparing the seedbed, the most improved methods of cultivation, and the best uses of the crop itself to bring the largest returns to the producer. This may seem like the study of agriculture, but in large sense, it is the vocational aspect of the Prairie Plains. The fine farm homes, the large barns, silos, granaries, filled to overflowing, the telephone, furnace heat, and the victrola are conditions and advantages gained by an intelligent use of the chief world resource, productive soil. The wiser and more expert the cultivation of the soil becomes, the larger the bank account and the greater the advantages of school and library and travel to the children whose good fortune it is to live in so wealthy a region. Vocational study and agricultural intelligence have reduced the cost of tilling an acre of corn, so greatly that even though the exhaustion of the soil fertility has naturally reduced the output, it has permitted the price of land to increase in market value two-hundred per cent. If education and life are to become one and the same, instruction in geography must emphasize those phases of the subject which clearly point the way toward prosperity and culture.

In the new era of education application to human affairs determines the trend of learning. Applied science is at a premium! No longer are formal lessons taught without due regard to their social functions. Waterfalls are not studied as ends in themselves, but for the purpose of understanding their influence on the industrial and social worlds. Their study must take cognizance of dynamic forces, the location of cities, the distribution of population, besides a half-hundred minor human activities—all of which radiate their influence into American civilization. So in any of the great regions, the most pertinent consideration is seen in the industrial or vocational contact of humanity with its environment, for through this contact any people or nation develops.

NOTES ON THE OHIO AND MISSISSIPPI VALLEY FLOODS

By R. DeC. Ward
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The Floods of the Ohio and Mississippi in 1912

A REPORT on "The Ohio and Mississippi Floods of 1912," by Professor H. C. Frankenfield, appears as *Bulletin Y* of the Weather Bureau. Detailed information regarding the character and extent of the basin of the Mississippi River has already been given, previously, in *Bulletin E,* Weather Bureau, 1897, and in the *Annual Report of the Chief of the Weather Bureau for* 1896-97. Years without floods are exceptional on the Ohio River and on the Mississippi below Cairo, Ill., but on the Mississippi above Cairo stages above the flood-line are the exception, and occur on the average about one year in four or five. The normal late winter and early spring rains over the lower Mississippi Valley generally suffice to bring the rivers almost to the flood stage from Cairo to the Gulf. If the spring rains over the Ohio Basin are then heavier than usual, a disastrous flood results in the lower Mississippi. When there is, in addition, plenty of snow on the ground, there is an extra supply of water to produce the flood. The Ohio and lower Mississippi Rivers alone can produce a flood, independently of the upper Mississippi and the great western tributaries of the lower river. The lower western tributaries have not, thus far, played an important part in flood causation, but the possibility of simultaneous floods in both eastern and western tributaries and in the main stream is always present.

The direct cause of the floods in question is the precipitation which occurs with the so-called "Southwest Type" of storms, which, although coming from farther west, do not develop true storm conditions until Texas is reached. Flood probability depends upon the number and time of occurrence of these particular storms, and upon the preceding conditions, of snow, frozen ground, etc. In the spring of 1912 a remarkable series of six storms, giving heavy rains or snows, resulted in a flood which established new high-water marks from Cairo to New Orleans, except near Vicksburg, where higher stages were prevented by crevasses. "To the flood of 1912 must be assigned first place in the flood history of the lower Mississippi Valley" is the opinion of Professor Frankenfield. The losses totalled over $78,000,000. The report contains numerous weather maps, snow bulletins, charts showing normals and departures of precipitation, and hydrographs.

The Floods of 1913

The Ohio Basin is unfortunately located as regards flood conditions. Practically all of it is in the region passed over by our southwestern type of storms, which are our greatest winter and spring rain-producers. The northern part of the Basin is, further, within the rainfall area of storms which follow the northern circuit. Secondary storms are also likely to develop

in the southwest, and pass northeast across the Ohio Basin. Heavy downpours in quick succession are apt to occur, as in the case of the torrential rains of March, 1913. The long-continued rains of "trough depressions" also occur here, with considerable frequency. Snow accumulates over the mountains, and its melting contributes much water to the streams. For these reasons the Ohio Basin has more precipitation than any other of the northern tributary basins of the Mississippi. There are also other contributing factors, such as the physical features of the Basin; the slope of the stream beds, etc. A combination of all the flood conditions has not occurred within our historical memory, but it is conceivable that it should. During the last forty-odd years the Ohio has been in decided flood, in its entirety, seven times, and in discontinuous flood much more frequently. The great majority of floods were due to heavy rainfall in the Ohio Basin, severe floods occurring almost invariably in January to March, sometimes overlapping into April.

The March flood of 1913 resulted from an unprecedented fall of rain over Ohio and Indiana from March 23 to 27. The rainfall for the watershed of the Ohio above Parkersburg averaged 4.7 inches; in places it was 10 inches. Many of the details of this flood are fresh in the minds of the readers of this Journal. Professor A. J. Henry has assembled a large amount of valuable information, statistical, cartographic, photographic, regarding the floods of 1913 in a recent *Bulletin* (Z) of the Weather Bureau, from which the foregoing facts are taken ("The Floods of 1913 in the Rivers of the Ohio and Lower Mississippi Valleys.")

OBSERVATIONS IN PORTO RICO

By Arthur D. Cromwell
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THE study of the West India Islands is interesting and it is to be regretted that the statements in our geographies and our geographical readers are so vague or misleading. During most of the year 1912, the writer was in the tropics. He spent one week in a place and had exceptionally good opportunities to meet the leading men of Porto Rico and to learn of its products and possibilities. Porto Rico is typical of any and all of the West Indies. The island is nearly one hundred miles long by forty wide. Its principal exports are unrefined sugar, coffee, tobacco, and fruits.

Around the border of the island is a strip about five miles wide. It consists of a light sandy soil with a very level surface. The surface is much leveler than the prairies of our Middle West. Rising very abruptly from this are the low mountains which in many places are rugged and picturesque. Rain falls most abundantly on the north side and mostly during the months from April to October. This is especially true of the low land on the borders. Rain falls in the mountains mostly during the months from Novem-

ber to March. The south side of the islands is dry and often needs irrigation.

Owing to absence of leaching, the soil on the south side is much richer than that on the north side. Hence when irrigated, the soil produces much larger and better crops. The nights are uniformly cool and the days hot, though the thermometer rarely goes above ninety-five; owing to the humidity, the days seem warmer to a northerner.

In most of the towns, I went into the stores and tabulated what I found for sale and where it came from. This was especially true of the groceries. The people are always courteous and kind and hence whenever I told a merchant what I wanted to do, he gave me every opportunity to examine his stock.

I find that my notes are much alike from all places. They read about like this:

Beans, cigars, onions, canned tomatoes and pears, soap, starch, canned fish, candies, crackers, and beef from America—Chicago and New York. Condensed milk and butter in cans from Denmark; hams from London; liquors from France and Spain; fish from Norway; nuts from Spain; sausages from Spain and France; cocoa from Philadelphia and France; flour from America; rice from Japan; guava-jelly, liquor, pine apples, alcohol and vinegar made in Porto Rico.

I asked in many places why the butter and milk was bought from Denmark instead of from America and the answer was always: "It tastes better," and "You have too many cows with tuberculosis." I asked why the meat was bought from Europe and the answer was: "You have too many hogs with tuberculosis and your packers are too dirty." When it comes to hardware, I found, as nearly as I could estimate, that a little over half comes from Germany. I was told that over half of the machinery in the sugar plants came from Germany. Again I asked why, and was told that German machinery is better. I do not know whether any thing is actually known as to the relative merits of these things, nor could I learn that our commercial companies are doing anything to convince the people of the islands and of South America that we can furnish superior goods.

An agriculturalist is prone to look upon a people somewhat as he looks upon farm animals. His question is, Are they efficient? Everywhere in the tropics the answer comes that the people are inefficient. But looked at from the native desire to become office men or office helpers, more bone and more muscle would be of no advantage. Nowhere did I see boys who were proud of their physique or who were doing anything to build it up. Nowhere did I find any interest in wrestling matches. There is very, very little "horse play" among the boys. The people are uniformly small, quick, nervous, dark eyed and dark haired.

The people live in houses without windows or doors such as we have in

the North, but shutters and solid board windows or doors are used instead. Though the nights are beautiful and the air unsurpassed for giving health, yet the people almost always sleep with windows of solid boards, closed tight. Many sleep in rooms entirely too small and with absolutely no means of ventilation. Consequently in that land where one may have fresh air twenty-four hours a day, tuberculosis is very prevalent.

Practically all laundry work is done in the streams. There is not, so far as I could learn, a well in the island except at the Experiment Station and Sugar Centrals, hence typhoid fever is a dreaded and terrible disease. The enforcement of the sanitary regulations is in the hands of the officers of the island and is uniformly well done. The island has an island police who are moved from place to place and who are giving very good service.

The lowlands are uniformly planted to sugar cane. The cane is planted once in three to five years and yields from $85 to $150 per year. The upland is planted to tobacco or is in coffee. The coffee is not well tended and hence the average crop is about 200 pounds per acre. But the better-tended fields yield from 600 to 800 pounds per year. Sugar cane is worth $25,000,000 and that with a 11 per cent cane. The United States experiment station has bred a cane by crossing a Porto Rican cane with a British cane from another island, and the new variety yields somewhat more than the native cane and contains 21 per cent of sucrose instead of 11 per cent which is the average for the island.

The raising of cocoanuts and grape fruit is increasing. One orchard has 500 acres of good, healthy, bearing cocoanut trees. The pine apple industry promises much. Pine apples can be grown in Porto Rico which surpass the best Hawaiian in size and flavor. They can be canned more cheaply in Porto Rico than in Hawaii and then shipped to New York for $9 per ton less than the Hawaiians can ship their canned goods for. Corn is grown in some places; some fields contain thirty and forty acres. The corn is small and almost no intelligence has been used as yet in breeding a corn for the island. The average ear of corn is smaller than an average North Dakota ear. But the people are becoming interested in the study of Agriculture. Agriculture has been introduced into the common schools, and a new College of Agriculture has been started at Mayaguez. And thus the Americans seek to carry not bayonets and bullets as did the conquering nations of old, but knowledge that will lead to better grains, sweeter and better fruits, fairer flowers and happier and more efficient men and women.

Next month we shall publish a list of the summer school courses in geography offered by the leading colleges and universities and by as many normal schools as send in the necessary data. The list could not be published this month because of incomplete information.

TEACHING SEASONS WITHOUT GLOBES

By Joseph F. Morse
Hyde Park High School, Chicago

THE almost universal method of demonstrating seasons is to show pupils a globe on which, by some device, the limit of sunshine and place of vertical noon rays at different seasons are indicated. Notwithstanding its prevalence, this way of presenting this subject is wrong pedagogically, and has proved a failure practically.

It is wrong pedagogically because it gives the pupil a view-point he will never occupy in experience. It shows him a sunlit earth as *seen from space*. To be of service in interpreting or anticipating experience, the space knowledge of seasons gained through inspection of globes must be converted into terms of possible experience. This is where the method breaks down practically. Few pupils who have thus viewed the earth from space succeed in getting back on the earth in a way to picture the sun's seasonal movement as it appears when viewed from the earth—the only view possible in experience. Ask any class of pupils who have studied seasons, however thoroughly, from globes whereabouts in the observer's sky the sun is during the weeks or months of continuous sunshine in the summer of polar latitudes, or how the sun moves with reference to the horizon to give perpetual equinox at the equator, or by what path below the horizon the sun passes from its setting to its rising point at a given season and latitude. Their answers will show how much they are still in the air in their understanding of the sun's movements as seen from the earth.

It is entirely unnecessary, as well as a great mistake, to use globes in teaching seasons. The pupil may be kept on the earth throughout his study of seasons by acquainting him with the relation of the horizon of different latitudes to the celestial equator and poles, and noting the apparent movement of the sun with reference to the celestial equator due to the earth's rotation and the slant of its axis.

Viewed from either pole of the earth the corresponding pole of the sky is overhead, and the celestial equator, being 90° from the sky poles, encircles the horizon. Viewed from the earth's equator the celestial equator, being parallel with and directly over the earth's equator, crosses the horizon due east and west and passes through zenith and nadir, and the sky poles, being 90° from the celestial equator, are on the horizon, due north and south. At all latitudes—except the poles—the horizon bisects the celestial equator—because horizon and celestial equator are great circles on the sky, and any two great circles on a sphere bisect each other.

As an observer passes from the equator toward either pole he tips his vertical—the direction taken by the radius of the earth extended—and his horizon plane in the direction he goes and as many degrees as he goes. This throws one sky pole above the horizon plane and the other below it as many degrees as the observer's latitude, and leaves the celestial equator inclined as many

degrees from the vertical as the latitude, but in the opposite direction.

At all latitudes between the equator and the poles the celestial equator crosses the horizon due east and west, as at the equator. To prove this let the pupil, imagining himself at any latitude between the equator and the poles, point one pencil at the pole of the sky that is above the horizon, and across the end of this place another pencil pointing due east and west. The two pencils will make a right angle with each other, whatever the elevation of the sky pole, proving that east and west are always 90° from the sky poles and therefore on the celestial equator.

The sun has two apparent movements on the sky, the yearly movement back and forth across the celestial equator, due to the constant slant of the earth's axis, and the daily westward circuit of the sky caused by the earth's rotation. To explain the sun's yearly movement with reference to the celestial equator use a pencil for the earth's axis, and thrust it through the center of a pasteboard disc of five or six inches diameter, representing the plane of the earth's equator. Let one hand represent the sun, and its forefinger, pointing horizontally at center of disc, represent the sun's rays directed toward the center of the earth. With the other hand carry the disc horizontally around the sun counter-clockwise, keeping the pencil inclined 23½° from vertical in the same direction. It will be necessary to reverse the relation of the hands in completing the circuit. The hand representing the sun will come in the plane of the disc—so that disc is edgewise to it—but twice in one revolution of the disc, at points that are opposite each other in the disc's orbit, or six months apart. During the half of the year that the north pole inclines toward the sun the sun will be seen to move gradually to a position 23½° north of the celestial equator (above the plane of the disc) and back again, and during the other half of the year an equal amount to the south of the celestial equator (below the plane of the disc) and return. Because of the constant slant of the earth's axis, then, the sun's declination (distance from the celestial equator) is constantly changing, the sun being on the celestial equator at the equinox dates, March and September, and 23½° to the north or south of the celestial equator at the solstice dates, June and December.

The daily eastward rotation of the earth causes the sun, in its relation to the horizon, to make a complete westward circuit of the sky each day. By combination of its two apparent movements the sun winds back and forth between its solstice positions by a screw-thread path—advancing north or south one thread a day, and requiring six months to coil its way from the celestial equator, at equinox, to either solstice position and return.

How the sun moves with reference to the horizon, in this coiling back and forth across the celestial equator, depends upon the relation of the celestial equator to the horizon. This varies with latitude in the manner shown above. Viewed from the north pole, the equinox sun, being on the celestial equator, would glide clockwise around the horizon. Between the March and September equinoxes, the sun would ascend from the horizon by a screw-

thread path to a height of 23½° and return to the horizon. During the other half of the year the sun would coil its way to a position 23½° below the horizon and return, being most of the time in the twilight belt—extending 18° below the horizon.

The seasons produced by such a yearly movement of the sun are easily figured out—an extremely cold winter, reaching its lowest temperature in February, and enough heat in June and July—through the continuity of the sunshine—to make polar dashes impracticable on account of open stretches of water, or the jamming together or southward drift of ice-floes.

Viewed from the equator the equinox sun, following the celestial equator path with reference to the horizon, rises due east, passes directly overhead at noon, and sets due west, and between the equinox dates the coiling movement of the sun carries its rising and setting points 23½° to the north and south of east and west, and its noon position the same number of degrees either side of the zenith. Seen from the equator the daily circling of the sky by the sun is always around a point on the horizon—the north or south pole of the sky, according as the sun is north or south of the celestial equator. Thus at the equator the horizon plane always bisects the daily path of the sun, making perpetual equinox.

The temperature seasons at the equator are due to the sun's seasonal movement just described. It is pretty hot all the time because the sun passes nearly overhead every day of the year, never crossing the meridian more than 23½° from the zenith. The yearly range of temperature is small because the days and nights are equal the year through, and because at a slant of 23½° from vertical—the farthest the noon sun gets from the zenith—sunshine loses but one-tenth of its vertical strength, as can be shown mechanically or by computation.

Let the pupil next imagine himself at some latitude between the equator and the poles, say 60° north latitude. At this latitude the equinox sun rises due east, passes 60° south of the zenith at noon, and sets due west while coiling northward from the celestial equator the sun, as seen from supposed latitude, circles around a point 60° above the northern horizon—the north pole of the sky—with a gradually shortening radius. It is evident that this will carry the noon sun higher and the rising and setting points of the sun far northward from east and west, and bring the midnight sun nearer the northern horizon, thus lengthening the day by lessening the daily dip of the sun below the horizon. As the radius with which the sun circles the north pole of the sky lengthens again, from June solstice to September equinox, the rising and setting points of the sun return to the east and west, the noon sun sinks back to a zenith distance equal to latitude and the daily dip of the sun below the horizon increases, lengthening the nights at the expense of the days. From September equinox to December solstice the sun winds around

a point 60° below the southern horizon with a shortening radius, this carries the noon sun lower and its rising and setting points southward from east and west, thus shortening the day by decreasing its daily arc above the horizon. With the return of the sun to the celestial equator the noon sun mounts higher again, the rising and setting sun approach the east and west and the nights even up with the days in length. It is evident that with such a yearly movement of the sun the winters would be very cold, on ac-

The Sun-Path Model with Twilight Disc Attached Adjusted for Chicago.

count of the short and low diurnal arc of the sun, and the summers rather warm, because of the length of the days and the height of the noon sun.

Northern seasons are reversed south of the equator because the south pole of the sky is above the horizon and the celestial equator inclines northward from the vertical. This brings the long days and high noon sun around the December solstice, and the short days and low noon sun around the June solstice.

The Sun-Path Model, pictured above, is the outgrowth of the writer's efforts to keep pupils on the earth while studying seasons.

The model consists of a horizon disc encircled by three parallel rings. The disc is crossed by north-to-south and east-to-west diameters, and has its circumference graduated in degrees. The middle ring, representing the celestial equator, as viewed from center of disc, is of the same diameter as the disc and is pivoted to the east and west points of disc. The outer rings, representing the tropics of the sky, as seen from center of disc, are of the proper diameter for this purpose, and are securd to the equator ring so as to turn with it while remaining parallel to it.

The Sun-Path Model is adjusted for different latitudes by orienting the disc with the points of compass, and inclining the rings from the vertical as many degrees as the latitude but in the opposite direction, southward for northern latitudes, and vice versa. The amount of inclination is gauged from the middle ring and is measured on the adjusting quadrant—shown in the illustration. In each adjustment the middle ring shows the daily path of the sun—above and below the horizon—at the equinox dates, when the sun is on the celestial equator, and the outer rings the daily course of the sun at the solstice dates, when the sun is 23½° from the celestial equator—to the north at the June solstice and to the south at the December solstice. By combination of its two apparent movements, yearly and daily, the sun moves from its equinox position to either solstice position and return by a screw-thread path, as shown above.

By the pivoting of the equinox ring to the east and west points of disc the equinox sun is seen to rise east and set west and to be twelve hours above the horizon at all latitudes—except the poles. The place of sunrise and sunset at solstice dates is read from the degree marks on the circumference of the disc. The time of sunrise and sunset in midsummer and midwinter, giving length of longest and shortest days, is read from time marks on the outer rings—see illustration. The altitude of the noon sun, and of the "midnight sun" in polar latitudes, is measured on the adjusting quadrant. The length of summer and winter twilight is shown by means of a twilight disc, placed at the proper distance below the horizon disc to mark the twilight belt. Adjustments for southern latitudes show reversal of northern seasons.

It is evident, without further description, that the Sun-Path Model serves as a three-dimension diagram adjustable to show the relation of the horizon of any latitude to the equinox and solstice sun-paths—the celestial equator and sky tropics—and that by use of the model pupils can be kept on the earth throughout their study of seasons, viewing always the sun from the earth, and not the earth and sun from space, as when globes are used in demonstrating seasons.

THE PREPARATION OF SALT ON THE FUKIEN COAST, CHINA

FUKIEN is one of the provinces of China on the southeast coast, lying between 23° and 28° N. Lat. It has a mean annual temperature of something more or less than 58°, and an annual rainfall of about 60 inches. Under these conditions the people who live on the flat coastal plains south of the Min River find that they can extract salt from the sea water with profit, and in this they are aided by the fact that the Chinese government controls the salt production and prevents foreign competition. The method of this preparation of salt may be of interest.

Pits have been dug in the flats and salt marshes along some parts of the coast which are flooded at times of high tide. When the tide covers these flats the pits are filled with water which remains after the recession of the sea, and it is from the water collected in these pits that the salt is largely derived. Near by are covered pits or filters, the cover being formed chiefly of loose and porous soil. The earth around the pits and filters, which, after it has been flooded, is saturated, is scraped up and used to cover the filters. The seawater is then taken from the pits and poured onto the saturated covers of the filters, taking with it some of the salt from the soil into the reservoir below. The purpose of the filter is, then, two fold: to increase the amount of salinity of the water which is used, and to filter out the mud with which the water has been mixed.

Later the water is dipped from these filters and poured into shallow pans some ten feet wide by fifteen long, with floors made of mosaics of small tiles. These pans are not more than an inch or two in depth, and form the evaporating pans, from which the salt is scraped after the water has been evaporated. This is done most successfully in the late spring and early summer months, when the percentage of cloudiness is relatively small, and the rainfall usually slight, before the rains that accompany the typhoon season commence. In this way concentrated solutions of salt water are prepared for evaporation in these open-air pans, and a coarse salt is derived by the evaporation which follows.—WALTER N. LACY, Foochow, China.

ALPHABETICAL DISTRIBUTION OF STATE NAMES

THE following may aid in fixing in the memory the names of the 48 states: The alphabet contains 26 letters,—12 from A to L; M and N are the middle pair of the alphabet; O to Z make up the remaining group of 12 letters:

A B C D E F G H I J K L——M N——O P Q R S T U V W X Y Z

The names of exactly 16 states, one-third of the 48, begin with one of eight letters included in the first group of twelve, namely, A C D F G I K L. The names of sixteen others begin with M and N, eight to each letter; the names of the remaining sixteen states begin with eight letters contained in the last group of twelve, namely O P R S T U V W.

Karl Boecklen.

ADD A DAY OR DROP A DAY?

By Charles Stratton, Ypsilanti, Mich.

THE following statements are given by various authorities regarding the International Date-line:

"Whenever a ship crosses this line to the westward, a day is added to the reckoning." Dryer, *High School Geography,* 1911, page 17.

"To correct such errors in their dates, navigators usually add a day to their reckoning when they sail westward across the meridian of 180 degrees." Lyman, *Advanced Arithmetic,* 1905, page 80.

"Vessels crossing the Date-line going west, drop one day." W. & A. K. Johnson, 18 inch Globe, 1909.

(Under topic of "Westward Travel")—"to have his calendar correct he must omit a day, that is, move the date ahead one day." Johnson, *Mathematical Geography,* 1907, page 94.

"Vessels crossing this line would add or subtract a day, depending on which way they were going." Hopkins, *Elements of Geography,* 1908, page 31.

"——ships changing their calendar one day on crossing this line." Beman & Smith, *Higher Arithmetic,* 1897, page 84.

Some of these statements seem contradictory while others convey no definite information. The following suggestions are meant to clear up the diffiiculty:

What does happen when one sails westward across the Date-line? Suppose it were possible to travel around the earth in twenty-four hours and a man started west Monday noon, keeping the sun overhead. To him it would be noon all the way around the earth for the sun would be in his zenith all the time, and according to his reckoning he would reach his starting place on Monday noon. But the people who had stayed at home would tell him that it was Tuesday noon. His calendar would be a day behind. Suppose he could travel only half as fast as the sun. By the time the sun had completed one revolution, and it was Tuesday noon at the place he started from, he would be just half way around the earth, opposite the sun, and the time to him would be midnight, Monday. When the sun had made another revolution it was Wednesday noon at the starting place, he would be back calling the time Tuesday noon. Again his calendar would be a day behind. If he travelled around the earth in four days he would lose a quarter of a day with every revolution and if in ten days, a tenth, and so on. No matter how long a time it takes, a person travelling westward around the earth sees one less sunrise and one less sunset than people who stay in one place; hence, if he returns on Wednesday he will call it Tuesday unless the correction has been made somewhere on the journey.

This correction is made at the Date-line and from the foregoing, we can see what it will be. If we cross the Date-line to the west at 2 p. m. Monday

we at once call the time 2 p. m. *Tuesday*. If it is June tenth we at once call it June *eleventh*.

This seems to agree with the rule, "Add a day to the reckoning." But what about the rule that says "Drop" or "Omit" a day? Our week has seven days of twenty-four hours each. If, as in the above example, we jump from 2 p. m. Monday to 2 p. m. Tuesday, we have skipped ten hours of Monday and fourteen hours of Tuesday. In that week there are five days of twenty-four hours each, one of fourteen hours and one of ten hours. Our week lacks twenty-four hours of being a full week. We have omitted twenty-four hours or have dropped a day. In that sense, the other rules are correct and adding a day *to the reckoning* is the same as dropping a day *from the week*.

The trouble with the statements is that they are incomplete and easily misconstrued. In teaching this subject we need clear and definite statements. To justify the use of the phrase, "add a day," we must state definitely that we mean *to add one to the ordinal number of the day of the month*. If it is the tenth day of the month call it the eleventh. If we say "drop a day," we ought to explain that we mean to drop one day from the week or month, making a week of six days instead of seven or a month of thirty days instead of thirty one.

In Johnson's *Mathematical Geography*, page 96, there is a second statement which is short and can hardly be misunderstood. It is, "Going westward across this line one must set his calendar ahead one day."

CURRENT MATERIAL FOR COMMERCIAL GEOGRAPHY

Trade of South America

WHILE the foreign trade of the world has increased 77 per cent since 1900 and that of the United States 86 per cent, the trade of South America has increased 165 per cent. The total increase of the South American trade in that period was $1,360,000,000, of which the increase in Argentina and Brazil combined amounted to $981,000,000, or 72 per cent of the total increase. The largest increase was in Argentina, which has more than doubled its trade since 1900.

It is natural that a trade representing over 2,000 million dollars would attract the attention of the great manufacturing nations of the world, and that there should be a great rivalry among them for that trade. Eighty-seven per cent of the import trade and 88 per cent of the export trade of South America is with European countries and the United States. The leading nations are the United Kingdom, Germany, United States, France, Italy, Belgium, Spain and Portugal. Portugal has very little trade with any of the South American countries except Brazil.

The three countries from which the largest amounts were imported into South America, according to the statistics of South American countries were:

United Kingdom, $267,954,000; Germany, $176,823,000; United States, $151,548,000. The United Kingdom, Germany and the United States control 62 per cent of the import and over 56 per cent of the export trade of South America.

The $1,187,000,000 worth of exports from South America consisted almost entirely of agricultural products, and these in the order of their value were as follows: Coffee, $262,000,000; maize, $108,000,000; wheat, $97,000,000; nitrate of soda, $96,000,000; rubber, $94,000,000; hides and skins, $85,000,000; wool, $75,000,000; frozen meat, $40,000,000; linseed, $34,000,000; tin, $24,000,000; oats, $21,000,000; live animals, $20,000,000, making a total of $956,000,000.

	Exports to S. A. from			Imports from S. A. into		
	United Kingdom	Germany	United States	United Kingdom	Germany	United States
	——Millions of dollars——			——Millions of dollars——		
1900....	127.5	118.7	102.7	103.2	44.9	41.2
1905....	214.0	188.4	144.9	146.5	74.9	66.4
1910....	301.2	216.1	189.4	242.5	118.2	100.3
1911....	278.8	235.3	187.5	225.3	138.5	121.7
1912....	325.1	267.7	233.8	238.5	153.2	138.9

Brazil depends mainly on coffee and rubber for its exports. In 1913 while the quantity of coffee exported increased 1,000,000 bags, the value decreased $22,000,000, owing to a falling in the price of about $5.00 a bag. The quantity of rubber exported decreased 3,400 tons and the value, $25,000,000. These large decreases were not offset by any increases of importance.

In Argentina there has been a great falling off in the value of the products of the pastoral industries, which was $22,000,000 less than in 1912. The greatest decreases were: wool, $13,000,000; hides, $3,500,000. Whether these figures indicate that Argentina has approached the limit of her resources in pastoral products cannot yet be determined. It will be found that in Chile, Bolivia and Peru, the same conditions exist as in Argentina, that improvement will probably be shown in the early future. In a very short time after the opening of the Panama Canal it is confidently expected that the countries on the west coast will be given a new life. The trade of the United States with them will rapidly increase because of the greater facilities of communication with the Gulf and Atlantic ports of the United States.

Taking Argentina as indicating the trend of affairs in South America, it is probable that the ability of South American countries to supply products to exchange for those of other countries is steadily gaining and the future of South America is assured. This being the case it would be well for the manufacturers of the United States to imitate those of its rival—Germany—

by sending agents with a knowledge of the language, and who will be willing to remain a long enough time in the country to acquire familiarity with the needs and methods of conducting business in these Latin countries, so that when the present depression shall have passed away and South America is able to secure the necessary loans for its development, the manufacturers of the United States will be on the ground to take advantage of the increased business that will naturally follow.—[*Commercial America.*]

Our Part in the World's Cotton Goods Trade

Cotton manufactures entering international markets in 1913 approximate 900 million dollars in value, and of this vast sum 55½ million dollars' worth was bought from the United States. This export trade of 55½ million dollars is large, very large if considered by itself alone, but a comparison shows it only seven per cent of the world's trade. This can hardly be looked upon as the proper proportion for a country which produces over two-thirds of the world's raw material forming the basis of the industry. In recognition of this fact the government of the United States, through its Department of Commerce is making special studies, both at home and abroad, with a view to enlarging the foreign trade in this important branch of American industry. The department has investigated conditions in South Africa and in the Mediterranean and has under way an investigation in the Orient, of all large importers of cotton textiles.

The Orient is the world's chief market for cotton goods. Into Asia the imports are about 350 million dollars annually, 200 million being taken by India and about 100 million by China.

The United Kingdom supplies about two-thirds of all cotton goods entering the world's international markets, its share being about 600 million dollars, compared with 130 million for Germany, 75 million for France, and 55 million for the United States, whose manufacturers are chiefly occupied in meeting the demands of the home market, which in 1909 exceeded 600 million dollars.

India, for example, imports about 200 million dollars' worth annually, and of this but about one million is supplied by the United States; China, 100 million, the American share about 8 million. Formerly China was the market for from 10 to 30 million dollars' worth of American cotton goods annually, the sales thereto having made a high record of 33½ million in 1905. The total had, however, fallen to 8 million in the calendar year 1913, and to even lower figures in 1912 and immediately preceding years.

The cotton manufacturers of the United States are, however, gradually increasing their sales abroad and in full larger measure the proportion which they supply of the great home market. Thirty years ago the imports of cotton goods into the United States exceeded the exports of like manufactures by 21½ million dollars; last year that excess had fallen to 10 million. The lower grades of cotton goods form the bulk of the exports of the

United States, while more highly finished products constitute most of the imports of cotton manufactures. Laces, embroideries and like articles contributed over one-half of the total value of cotton goods imported.—[Abridged from *Commercial America.*]

How Physiographic Features Have Contributed to the Growth of Atlanta

Atlanta, inoculated with the Atlanta Spirit, brewed by Evan Howell and Hemphill, and injected into every citizen who came here through The Constitution, rose from its ashes to become the most important city of the south. Men began to recognize the fact that most of our great manufacturing towns in the United States are not on coalfields and above beds of iron ore, and they were inclined to give a little too much credit to mere man, failing to note that practically all of our great cities are situated on spots where the geogrophical features have determined the convergence of great lines of communication. Even Pittsburg and Birmingham afford only seeming exceptions to this rule, for the growth of both cities has been greatly promoted by the convergence of waterways and of railways; and now that more rapid transportation and heavier loads have become necessary, they must in time yield to the towns of the plain or the peneplain.

Atlanta, lying as it does on the upper edge of the piedmont plateau, and nearby the gates to the West and Northwest, was directly on the shortest and easiest route from the river navigation of the Northwest at Nashville to river navigation at Augusta and to the cities of the south Atlantic seaboard. It was at the same time near to the Mississippi valley of the south and to the gulf coast. The piedmont plateau has no heavy gradients to be overcome for the entire length of our Atlantic seaboard states. And thus Atlanta has come to be the natural cross-roads for the whole southern section of our country, and it is not surprising that fourteen lines of railway radiate from this spot, and that Atlanta is steadily and surely becoming the most important city in the South, and one of the most important in the nation.

A railway train across the mountains from Salisbury to Memphis was recently discontinued because the way around the end of the mountains by Atlanta proved the easier and the quicker, because it had no great gradients to overcome, though the way was very much longer. So, a party of scientists sent out by a government bureau from Washington some time ago actually went by Atlanta to Kansas City, because the way was very much easier and the time actually shorter.

The South has 66 per cent of the coal area of the eastern United States and 86 per cent of the tonnage, and Atlanta has easier access to every variety of this coal than any other city in the country, for even Memphis finds it easier to get her coal from Pittsburg than from the southern field, and this gives Atlanta every advantage in the way of future growth and development.—[From address by Collier Cobb, Atlanta Meeting of A. A. A. S. Dec. 1913.]

Where to Locate an Industry

'SOMEWHERE in the State of New York, in the early part of the last century, David Maydole made some good hammers, and his neighbors began beating the track to his door, and finally the whole world came to him for hammers. In those old days, factories were not 'located,' they 'just growed,' and their location was usually the town in which the owner happened to live. Many famous concerns had their beginnings in this way in locations which nowadays would be thought to have many disadvantages. The Fairbanks Company, in St. Johnsbury, Vermont is an instance.....

"In modern times, however, these special advantages which were held by some manufacturers are disappearing. Cheap labor has gone, business enterprise is becoming universal, and goods are now bought on specification and test rather than upon the name of a brand. Reputation, which used to be obtained by long years of struggle, is now obtained in two or three years by extensive advertising and by public demonstration of quality and performance. Success in manufacturing in the future is to obtained not by mere reputation for quality and by two or three favorable conditions, such as ample capital and cheap labor, but only by the combination of all the desirable conditions, one of which is location.

"The fact that locations that were good enough in past times are not good enough now is shown by the migrations of many large concerns and the establishment of new concerns in places far removed from the old centers of industry. The first great relocation of industries in this country took place in the iron trade. Fifty years ago its center was in eastern Pennsylvania, chiefly in the Lehigh and Schuylkill valleys. Between 1870 and 1880 it was moved to Pittsburg and vicinity, to Cleveland, to Chicago, and to Alabama. Philadelphia then was the center of the heavy machine-tool trade, with numerous small concerns in New England; now Cincinnati and Cleveland are competing with them in foreign as well as in domestic markets. Shoe-manufacturing, which used to be confined to New England, is now being scattered over the West. Cotton-manufacturing has developed in the South. Of individual concerns that are moving or scattering, instances are the Baldwin Locomotive Works, of Philadelphia, which is building a new works on the Delaware near Chester, and the General Electric Company, which is locating its new plant at Erie, Pa., on Lake Erie, instead of enlarging plants at Schenectady and at Lynn."....

"Some of the conditions that should be taken into account in locating a new factory that is expected to become of great size are the following: With respect to material. Cost of obtaining raw material delivered at the factory; permanence of the supply from its present source; where other supplies may be had if the presence source fails (lumber, for example). Cost of transportation of finished goods to the various markets. Transportation by automobile-trucks, by rail, by water, river, lake, or canal. (The open-

ing of the Panama Canal and of the New York Water Barge canal is going to affect some locations.) Cost of fuel, coal, oil, or gas; if oil or gas, permanence of the supply. Water power, quantity available and its probable permanence. Electric power from a central station, cost of, compared with cost from an isolated plant.

"Real estate. First cost, taxes, present and prospective; room for extensions; room for development of a workmen's town.

"With reference to labor: Availability of an abundant supply, skilled and unskilled. Conditions for keeping workmen satisfied to remain in the works, nearness of city or town supplying good and cheap market, comfortable homes, schools, playgrounds, churches, hospitals, medical attendance, recreation. Control of trade-unions."—[*The Engineering Digest.*]

North Sea Shipping

THE rate war between the Hamburg-American line and the other transatlantic steamship lines—English, German, Dutch, French, and American—gives interest to a recent article in the London *Economist,* showing the enormous growth and great volume of the shipping of the North Sea. Considering its daily weight and value afloat, the North Sea is declared by this writer to be "by far the busiest and richest expanse of sea in the world." The writer can not better describe it than by saying the North Sea is "the Trafalgar Square of shipping." Mighty states and thriving towns are dependent upon it. While its whole seaboard can not be much more than 4,000 miles long, it is probably correct to say that "seven-eighths of the ocean-going shipping of the whole world of foreign trade is owned and registered in countries which surround this sea." It embraces waters which stretch from the Straits of Dover on the south to the Shetland Islands and the coast of Norway on the north, and on the east is bounded by the mainland of Europe and by the Baltic Sea as entered through the Cattegat. Its length is over 600 miles, its maximum width 400 miles. The countries bordering upon it are "the greatest seafaring nations of the world"—England, Germany, Norway. Its ports possess between them "half the mercantile tonnage of the world." Following is a table of the tonnage of North Sea vessels that have entered and cleared in the foreign trade in the year 1911-1912.

As will be seen in this table, the North Sea ports of chief importance are London, Hamburg, Antwerp, and Rotterdam. Their totals of foreign trade are close enough to one another to make them vigorous rivals for first place. It appears that both Antwerp and Hamburg have surpassed London in the tonnage of shipping entered and cleared in its foreign trade, while Rotterdam is now "running a neck-and-neck race with London and threatens to outstrip her three competitors." Rotterdam in recent years has thrived under very progressive commercial activity, and Antwerp accordingly has suffered severely—especially in her grain trade; but Antwerp has undertaken,

through the construction of four new grain elevators and an extension of her port, to compete—and with better success thus far—with her rival.

The writer notes as curious the fact that Hamburg, during the last few years, has made less progress than either Antwerp or Rotterdam—that is, the increase relatively has been greater in these ports of the Netherlands than in the great German port. The writer surmises that Antwerp at the mouth of the Scheldt, and Rotterdam, at the mouth of the Rhine, "have been found more convenient as shipping centers for the great industrial districts of Westphalia and southern Germany than the more northerly port at the mouth of the Elbe, admirably though it may be situated for serving Berlin, Saxony, and Silesia."

	Entered		Cleared	
	1911	1912	1911	1912
	Net Tons	Net Tons	Net Tons	Net Tons
London*	13,163,101	12,985,658	11,172,298	11,064,139
Tyne Ports*	7,460,559	6,737,768	8,335,762	7,819,965
Hull*	4,040,027	4,360,000	3,601,467	3,860,851
Middlesbrough*	2,090,444	2,227,881	1,965,358	2,075,195
Antwerp	13,233,677	13,686,297	13,272,665	13,665,346
Ostend	1,117,206	1,104,078	1,105,967	1,094,337
Rotterdam	10,624,499	12,126,581	10,609,814	11,950,422
Amsterdam	2,002,862	.....	1,936,732	.....
Bremen	3,192,737	3,363,218	3,073,578	3,269,817
Hamburg	11,868,709	12,346,600	11,994,379	12,594,733
Christiania	1,541,555	1,389,360	1,108,093	1,545,466

While London, as a port of foreign shipping, is falling behind the three other great harbors of the North Sea, we are not to disregard the immense amount of coasting trade that converges in the Thames. Great Britain has a much greater coast-line in the North Sea than Belgium, or Holland, or Germany; hence the far greater volume of her coasting trade, which in 1912 produced a total in arriving vessels of 5,761,278 net tons, and in departing vessels of 7,865,067 net tons. The same point might be made as to Newcastle, whence in 1912 coasting-trade shipping worth 3,285,398 net tons departed. In the aggregate it appears that about 20,000,000 net tons of coasting-trade shipping departed last year from British North Sea ports.—[*Literary Digest.*]

*The statistics for these ports represent the tonnage "arriving" and "departing," which is slightly larger than the "entrances" and "clearances."

NEWS ITEMS

AN exhibition of geographical materials was held at the Salem Normal School (March 16 to April 13) for the purpose of suggesting to superintendents and teachers what is obtainable to make the teaching of geography richer and more interesting. The materials included a large collection of maps, atlases, and books loaned by the American Geographical Society of New York, exhibitions of geographical magazines and of book publishers, pamphlets, describing courses in geography given in various cities, manufacturers' exhibits of raw materials and stages of production, and over 1000 books and pamphlets that may be obtained in most cases merely for the asking from boards of trade, government bureaus, steamship and railway offices.

During the exhibition on Saturday mornings one-hour stereopticon talks and pedagogical lectures of interest to geography teachers were given.

The first joint meeting of the American Geographical Society and the Association of American Geographers was held in New York Friday and Saturday, April 3rd and 4th, 1914. Papers were read by L. A. Bauer on "The General Magnetic Survey of the Earth," by T. W. Vaughan on "The Platforms of Barrier Coral Reefs," by F. J. Turner on "Geographic Influences on American Political History," and on other geographical subjects by Messrs. Hobbs, Johnson, Shaw, Fassig, Smith, Atwood, and Cobb.

Cornell University has laid special emphasis upon its summer work in geography since the days when Professor R. S. Tarr organized his summer school of geology and geography ten or twelve years ago. An exceptionally handsome, illustrated booklet describing the summer school courses and excursions has recently been issued from the University. The excursion feature of summer school geography has been developed more fully at Cornell than anywhere else. Professor von Engeln, who is now in charge of the work, has evidently inherited Professor Tarr's enthusiasm for field work and is carrying it on with a high degree of success. Copies of the illustrated booklet may be obtained by addressing Director of Cornell Summer School, Ithaca, New York.

The Geography Supply Bureau of Ithaca, New York, has recently issued a new descriptive catalogue of lantern slides for meteorology and climatology. It also includes a special lecture set dealing with the Dayton flood. The Geography Supply Bureau is developing into a useful clearing house of geographical materials, and we hope the success of the experiment may warrant the constant expansion of its activities so that there may be a central bureau from which geography teachers may obtain practically anything that they need in the way of materials for their work.

The Canada Newspaper Company, Limited, Confederation Life Building, Toronto, Canada, has issued a large, illustrated publication entitled *Canada Today*. While a considerable space is devoted to advertising and promoting, yet a large amount of useful and timely information upon nearly all phases of Canadian life and development is given.

Professor Howard E. Simpson of the University of North Dakota has recently published a bulletin of fifty pages on the Physiography of the Devilsstump Lake Region of North Dakota. It contains a map of the state, showing the physiographic provinces and includes an authoritative description of the larger features of the state, in addition to a detailed description of the region which is principally under discussion.

The Wisconsin number of the JOURNAL OF GEOGRAPHY was the largest edition of the magazine ever issued. 2700 extra copies were ordered before the magazine came from the press. Orders are being constantly received and the edition will probably be exhausted within a few weeks of its publication.

Mr. E. Dudley Parsons, of the West Side High School, Minneapolis, has written and published (1913) *The Story of Minneapolis,* an attractive little book of 180 pages, and many illustrations. The geographical elements form only a part of the "Story." The chapter titles suggest the plan of treatment: Beginnings, St. Anthony, The Village of Minneapolis, Becoming a City, Boom Times, A City Indeed, A Great City, A Good City. The book is written with a larger purpose than simply supplying interesting information; it aims to make pupils proud of their city, jealous of its good name and interested in its civic life.

Professor L. H. Wood, of the Kalamazoo, Mich., State Normal school, has just published with the imprint of the Horton-Beimer Press of Kalamazoo, his 300-page book on the *Physical, Industrial, and Sectional Geography of Michigan*. This is the largest text book devoted to the geography of a single state that we recall. Part I deals with Natural and Human Resources, Part II with Human Life, Transportation and the various Industries and Part III with the three Provinces of the state. The information given is so detailed that the book supplies material for the local geography of practically every part of the state. There are many maps and a host of half tones. The book represents an enormous amount of work and places at the disposal of Michigan teachers a wealth of material. The author evidently intends it to be used rather as a source from which teachers and students may draw material than as a text book in the ordinary sense.